# **SIEMENS**

# **ARCADIS**

SP

System Manual

# **Replacement Instructions**

Replacement of the ON/OFF Assembly

These instructions are valid for the replacement of the ON/OFF assembly, material no. 80 81 932, on ARCADIS Varic systems, material no. 80 80 017 up to serial no. 10316, and ARCADIS Orbic systems, material no. 80 81 080 up to serial no. 20085.

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n.a.

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## Notes and symbols

Text emphasized in technical documentation has the following meaning:

**⚠DANGER** 

DANGER indicates an immediate danger that if disregarded will cause death or serious physical injury.

**∆WARNING** 

WARNING indicates a possible danger that if disregarded can cause death or serious physical injury.

**∆CAUTION** 

CAUTION used with the safety alert icon indicates a possible danger that if disregarded will or can lead to minor or moderate physical injury and/or damage to property.

NOTICE

NOTICE used without the safety alert icon indicates a possible danger that if disregarded may or will lead to an undesirable result or state other than death, physical injury or property damage.

# Validity of these instructions

n.a.

These instructions are valid for the replacement of the ON/OFF assembly, material no. 80 81 932 on ARCADIS Varic systems, material no. 80 80 017 up to serial no. 10316, and

ARCADIS Orbic systems, material no. 80 81 080 up to serial no. 20085.

1 - 2 General

# Safety information

#### **General safety information**

**∆WARNING** 

Danger of injuries, death or material damage.

#### Note

- the product-specific safety notes in these instructions,
- the general safety information in the document TD00-000.860.01...

and

- the safety information in accordance with ARTD Part 2.

Non-compliance can lead to death, to injuries or to material damage.

#### General electrical safety information

**AWARNING** 

**Electrical safety!** 

Non-compliance can lead to severe injuries and even death as well as to material damage.

After opening the cover panels, the parts under voltage are accessible. To avoid danger, disconnect the system from the power supply prior to opening the covers. Pull out the power supply plug.

If an uninterruptible power supply (UPS) is installed in the system, the voltage output of the UPS must also be deenergized or the voltage output plug must be disconnected.

If work has to be performed under electrical voltage, the general safety information according to TD00-000.860.01... must be complied with.

**⚠CAUTION** 

n.a.

Electrical voltage!

Non-compliance can lead to material damage.

When working on the system, ESD regulations must be observed.

General 1 - 3

#### **Radiation safety information**



#### X-ray radiation!

Non-compliance can lead to illnesses, irreversible damage to body cells and the genotype, severe injuries and even death.

When performing work on the system during which radiation must be released, the radiation protection directives and the rules for radiation protection according to ARTD 02.731.02 must be complied with.

#### Please note:

- Use available radiation protection devices.
- Wear radiation protection clothing (lead apron).
- Stay as far away as possible from the radiation source.
- Release radiation only if necessary.
- Set radiation activity as low as possible.
   (Low kV and mAs values, short radiation time)
- Release radiation for as short a time as possible.



Checks in which radiation must be released are identified by the radiation warning symbol.

#### **Mechanical safety information**



Danger of burns on hot parts or components!

Non-compliance can lead to slight to medium injuries, especially of the hands.

After opening the cover panels, parts and components (e.g. power components, cooling units, electromagnetic brakes) are accessible that can have temperatures of > 50 °C during operation.

To avoid burns, switch the system off prior to touching parts or components and let it cool down for at least 5 minutes.



n.a.

Danger of injuries on mechanical parts!

Non-compliance can lead to slight to medium injuries, especially of the hands.

Parts such as flat plugs, threaded bolts, cut-off cable ties and component edges that, if care is not taken, can cause crushing, abrasion and cuts to the skin, particularly to the hands, can be touched after the covers are opened.

Perform the required work with special care and attention to detail.

If needed, wear working gloves.

1 - 4 General

## Safety information - risk of infection

# **∆WARNING**

Danger of infections due to pathogens!

Non-compliance can lead to severe injuries and even death.

This product can be contaminated by infected blood or other bodily fluids.

Avoid all contact with blood or other bodily fluids!

Strictly observe the safety information in ARTD-002.731.37... regarding prevention of infectious diseases during customer service calls.

#### Information on the ground wire resistance test

Observe the instructions in the safety rules for installation and repair (ARTD-002.731.17 ...).

The ground wire resistance must be measured after every intervention in the system.

However, documentation of the measured values is required only during periodical safety checks.

If parts/components that can decisively influence the ground wire resistance are replaced (e.g. replacement of the mains cable, replacement of the ON/OFF assembly, replacement of multi-core connection cables, which also make the ground wire connection between parts of the system (e.g. monitor cable or C-arm cable)), or if ground wire connections have been repaired, then the ground wire resistance must be measured. The values must be documented and evaluated in the ground wire resistance protocol.

#### NOTE

Evaluate the results by comparing the first measured value to the corresponding values documented during preceding maintenance procedures or safety checks.

A sudden or unexpected increase of the measured values, even if the limit value of 0.2 ohms is not exceeded, indicates errors in the ground wire connections. (Ground wire or contacts).

The measurement must be made according to DIN VDE 0751, Part 1 (see ARTD Part 2). In this case the ground wire resistance in the normal operating condition to all conductive touchable parts of the system must be measured.

Make sure that control cables or data cables between the system components do not imitate a ground wire connection.

During the measurement the power cable and additional connection cables which also make the ground wire connection between parts of the system (e.g. monitor cable between C-arm chassis and monitor trolley) must be moved section by section to detect broken conductors.

The ground wire resistance must not exceed 0.2 ohms.

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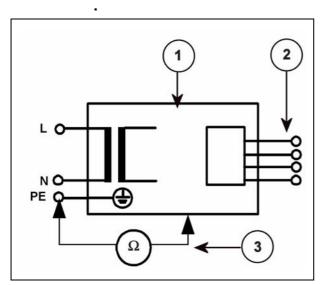


Fig. 1 Measuring circuit for measuring the ground wire resistance in systems that are disconnected from the power supply, according to DIN VDE 0751-1:2001-10, Fig. C2.

- 1 = System
- 2 = Applied part (not present)
- 3 = Measuring arrangement (integrated in the measuring instrument)

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#### Information on measuring the system leakage current

**NOTE** 

If parts in the primary circuit (e.g. power cable, line filter, power transformers, or complete ON/OFF assemblies) are replaced during service work, the system leakage current measurement must be subsequently performed and recorded as a repeat measurement.

However, the first measured value must be newly determined and a new protocol must created under the following conditions:

- Lack of system leakage current measurement documentation.
- Local line voltage or line frequency deviating from the line voltage and line frequency documented in the report (e.g. in the event of a site/operator change).
- Use of a different procedure for measuring the system leakage current from the one documented in the report.

For the purpose of traceability, reference to the new report must be written on the old report. The reason for newly determining the first measured value must be documented and confirmed with a name and signature.

Observe the instructions in the safety rules for installation and repair (ARTD-002.731.17 ...).

**⚠WARNING** 

#### **Electrical voltage!**

Non-compliance can lead to severe injuries and even death.

The leakage current measurement may be performed on systems of protection class I only after the ground wire test has been passed.

#### First measured value

The first measured value was already determined and documented in the system leakage current protocol. The measuring procedure was also recorded.

The measurement was performed with the recorded line voltage, line frequency and with the recorded measuring equipment.

#### Measurement

Perform the measurement according to DIN VDE 0751, Part 1 (see ARTD-002.731.17....), and record the determined value.

The measuring procedure indicated in the protocol must be used.

If the first measured value has to be newly determined (see note), a measuring procedure can be selected (direct measurement or differential measurement).

Measurement of the system leakage current according to the differential current method (measuring arrangement according to Fig. 2) must be given preference, since no danger for the person performing the measurement and other persons arises during the measurement.

However, please note the minimum resolution of the system leakage current measuring instrument and any additional manufacturer's instructions restricting the use of the measuring device.

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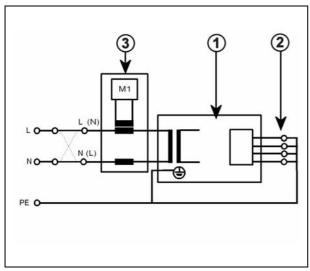


Fig. 2 Measuring circuit for measuring the system leakage current according to the differential current method according to DIN VDE 0751-1:2001-10, Fig. C6 for protection class I.

- 1 = System
- 2 = Applied part (not present)
- 3 = Measuring arrangement (integrated in the measuring instrument)

If the direct measurement of the system leakage current is used (measuring arrangement according to Fig. 3), then the system must be set up insulated during the measurement and must not be touched during the measurement.

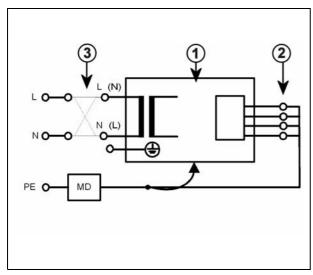


Fig. 3 Measuring circuit for the direct measurement of the system leakage current according to DIN VDE 0751-1:2001-10, Fig. C5 for protection class I.

- 1 = System
- 2 = Applied part (not present)
- 3 = Measuring arrangement (integrated in measuring instrument)

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### **∆WARNING**

#### **Electrical voltage!**

Non-compliance can lead to severe injuries and even death. No housing parts of the system may be touched during the direct measurement of the system leakage current (measuring arrangement according to Fig. 3).

Access to the system by third parties must be prevented.

The system must be switched on during the measurement. Measuring devices with automated measuring sequences must therefore be set to manual measurement.

The highest value must be entered in the system leakage current protocol.

This value must not exceed the permissible leakage current values of 2.5 mA according to DIN VDE 0751-1:2001-10, Table F.1, line "System leakage current for devices according to remarks 1 and 3".

Measure and record the current line voltage. If the measured line voltage deviates from the nominal voltage, correct the measured value to the value corresponding to a measurement at the nominal value of the line voltage. This is also to be documented.

Document the measuring procedure (differential measurement or direct measurement) and the measuring device used (designation and serial number).

In the case of repeat measurements, the measured value must also be evaluated.

#### **NOTE**

Evaluate the results by comparing the first measured value to the corresponding values documented during preceding maintenance procedures or safety checks.

A sudden or unexpected increase of the measured values may indicate that a fault has occurred in the primary circuit of the power supply (damaged insulation, damage caused by humidity, defective interference suppressor, etc.) - even if the limit value of 2.5 mA is not exceeded.

The evaluation is not necessary in the case of a new determination.

File the protocol sheet in the system folder or log book.

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## **Required documents**

**ARCADIS Varic:** 

General Safety Information TD00-000.860.01....

Circuit Diagram G2266

Replacement Instructions SPR2-310.841.01....

ARCADIS Orbic:

General Safety Information TD00-000.860.01....

Circuit Diagram G2266

Replacement Instructions SPR2-320.841.01....

# Required tools and measurement devices

Standard tool kit\*

Digital multimeter

e.g. Fluke 187 99 94 831

Ground wire tester and leakage current

measuring instrument 5138 727

e.g. Safety Tester UNIMET 1100

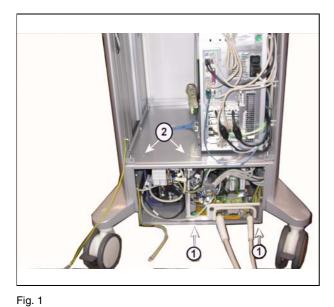
# **Required material**

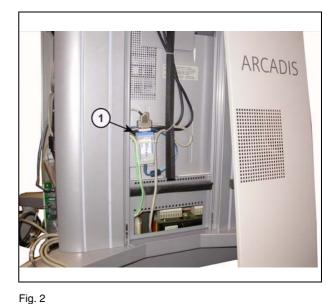
ON/OFF assembly	80 81 932
Cable set	80 81 965

<sup>\*</sup> not included in Service Tool Catalog

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# Opening the monitor trolley

#### WARNING

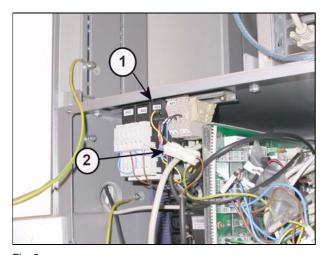
**Electrical safety!** 

Non-compliance can lead to severe injuries and even death as well as to material damage.

Observe the safety information in Chapter 1 of these instructions.

Deenergize the system and disconnect the power plug. Pull out the power plugs (power input and power output) at the uninterruptible power supply.

- Switch the system off and wait for it to be shut down.
- Pull out the power plug and secure the system against switching on again.
- Remove the rear panel of the monitor trolley (Fig. 1).
- Remove the cover on the left side of the monitor trolley (Fig. 2).
- Remove the lower cover on the rear of the monitor trolley (Fig. 1).
  - The ON/OFF assembly and the uninterruptible power supply (UPS) are accessible.
- Pull out the two power plugs on the UPS.



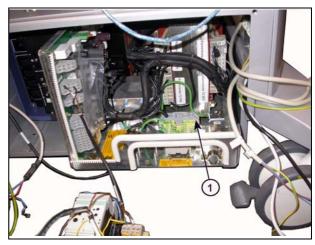


Fig. 4

Fig. 3

# Removing the relay assembly

- Loosen the two screws 2/Fig. 1.
- Disonnect the two terminals K21.A and K21.B on the relay assembly, relay K21 (1 Fig. 3).
- Pull out connector X12 on the ON/OFF assembly.
- Disconnect the two cables X11.1 and X11.4 from terminal strip X11 of the ON/OFF assembly.
- Loosen the plug connection X22 (2/Fig. 3).
  - The relay assembly is loose and can be removed. It is not replaced.

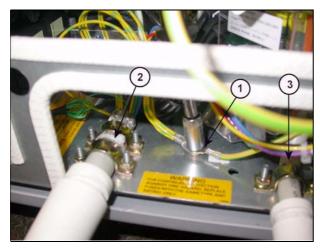




Fig. 5

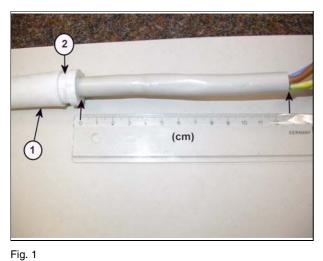
Fig. 6

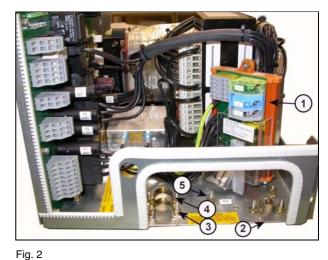
# Removing the ON/OFF assembly

- The ON/OFF assembly is attached to the base plate with 4 Allen screws. Loosen the 4 Allen screws.
- Pull the ON/OFF assembly approx. 10 cm out of the monitor trolley (Fig. 4).
- Pull out connectors D50.X6, D50.X7, D50.X8, D50.X9.
- Disconnect the cables connected to terminal strips D50.X2, D50.X3, D50.X4 and D50.X11 of the ON/OFF assembly.
- Disconnect cables D66.X5 and D66.X1 from the PC and pull them back to the ON/OFF assembly. To do this, cut open the existing cable ties.
- If the 3D Reconstruction option is present, disconnect the CAN cable from the USB-to-CAN converter (1/Fig. 6) and pull it back to the ON/OFF assembly.
- Unscrew the ground wire from the ON/OFF assembly (1/Fig. 5).
- Unscrew the cable clamps of the monitor trolley cable and the power cable (2 & 3/Fig. 5).
- Disconnect the power cable (ground wire, N and L1) from terminal strip 1/Fig. 4.
- Pull the power cable and the monitor trolley cable out of the ON/OFF assembly.
- The ON/OFF assembly can now be taken out of the monitor trolley. Due to the weight of the assembly, 2 persons are needed for lifting it.

# **Removing the ON/OFF Assembly**

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# **Preparations**

**NOTE** 

The ON/OFF assembly is set to 230 V AC by default. If the local mains voltage differs from that, the ON/OFF assembly must be set to the local mains voltage prior to startup. Please observe the fuse values for fuses F1 and F2 for the relevant mains voltage.

- Before installing the new ON/OFF assembly, it must be set to the local mains voltage according to the circuit diagram (see Fig. 4).
- Check the fuse values of fuses F1 and F2. For mains voltages of 200 V AC to 240 V AC, 15 A slow-blow fuses must be used. For mains voltages of 100 V AC to 127 V AC, 20 A slow-blow fuses must be used.

# Wiring

#### **Layout D50**

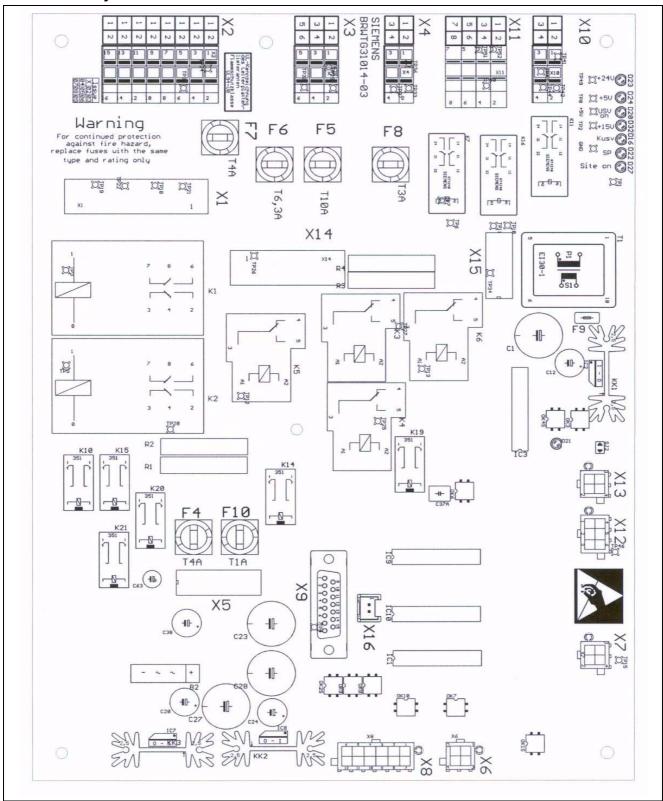


Fig. 3

#### Connecting the power cable

- Pull the anti-kink sleeve of the power cable (1/Fig. 1) over the power cable so that approx. 13 cm of the gray insulated cable are exposed. See Fig. 1.
- Run the power cable through the cable opening to the cable clamp (Fig. 2). The groove
  of the anti-kink sleeve (2/Fig. 1) rests in the sheet metal notch (2/Fig. 2) of the ON/OFF
  assembly.
- Reattach the power cable with the cable clamp.
- Connect the power cable to the power terminal:
   X1. ground wire (yellow/green terminal yellow/green cable)
   X1.N (blue terminal blue cable)
   X1.L1 (gray terminal brown cable)

#### Connecting the monitor trolley cable

- Run the monitor trolley cable through the cable opening to the two cable clamps (Fig. 2).
- Attach the gray sheath of the monitor trolley cable (strain relief) with the clamp 3/Fig. 2.
- Connect the shield of the monitor trolley cable to ground using the clamp 4/Fig. 2. In doing so, ensure good ground contact of the shield.

### Inserting the ON/OFF assembly

Lift the ON/OFF assembly into the monitor trolley by its rear side and push the assembly in.
 For better accessibility, the ON/OFF assembly should project out of the monitor trolley approx. 10 cm.

## Connecting the ground wire

Connect the ground wire coming from the monitor trolley together with the ground wires from the monitor trolley cable to the ground wire terminal (base plate of the ON/OFF assembly) and tighten them with screws (5/Fig. 2). In doing so, ensure good contact of the ground wire with the ON/OFF assembly.

#### Wiring of D66.X1 and D66.X5

 Run cables D66.X1 and D66.X5 through the existing cable duct of the monitor trolley to the PC (imaging system) again, plug them into D66.X1 and D66.X5 and fasten them.

#### Wiring of CAN cable (3D Reconstruction option)

• If the 3D Reconstruction option is present, run the CAN connector to the CAN-to-USB converter again, plug it in and fasten it.

#### Replacement and wiring of PS/2 cable

The PS/2 cable in the monitor trolley is discarded and replaced by the PS/2 cable supplied with the cable set.

- Remove the old PS/2 cable completely.
   To do this, cut open the cable ties and remove them.
- Run the new PS/2 cable from the PS/2 plug of the PC (imaging system) parallel to the
  existing cables of the CIPP board (D66) to the ON/OFF assembly D50 and connect it to
  connector D50.X13.
- Attach the new cable to the existing ones with cable ties. Make sure there is no mechanical strain (tension on the cable) on the PS/2 connector.

### Wiring of adapter cable D50.X12- X22

- Wire up the adapter cable D50.X12 X22 supplied with the cable set.
- To to this, connect the plug connection designated X22 with connector X22 and plug the other end D50.X12 into the ON/OFF assembly.

#### Wiring on D50

- Plug in connector D50.X9 and screw it on. Make sure that connector D50.X16 is not bent or disconnected.
- Plug in connector D50.X8.
- Plug in connector D50.X6.
- Plug in connector D50.X7.
- Plug in connector D50.X13.

#### Wiring of terminals D50.X2, D50.X11 and D50.X4

WARNING

**Electrical safety!** 

Non-compliance can lead to severe injuries and even death as well as to material damage.

Observe the safety information in chapter 1 of these instructions.

Do not yet connect the UPS input and output power cables to the UPS!

- UPS power input: Disconnect the power cable with the installed power coupler from the old ON/OFF assembly and use it for wiring the UPS according to the table.
- UPS power output: Use the power cable with installed power plug included in the supplied cable set for wiring the UPS according to the table.
- Connect the power cables of the components installed in the monitor trolley according to the table:

	Terminals on the ON/OFF assembly D50					
Component	Live (left) monitor	Reference (right) monitor	PC (image processor)	UPS input	UPS output	Options (e.g. int. printer)
Cable blue	X11.2	X2.1	X11.3	X4.2	X11.1	X2.1
Cable brown	X11.5	X2.2	X11.6	X4.3	X11.4	X2.2
Cable yellow/green (ground wire)	PE (ground wire terminal)	PE (ground wire terminal)	PE (ground wire terminal)	PE (ground wire terminal)	PE (ground wire terminal)	PE (ground wire terminal)

#### Wiring of terminal X3

• Connect cables X3.1 to X3.6 (monitor trolley cable) according to the following table:

Color of monitor trolley cable	green	red	yellow	black	violet	blue
Terminal D50	X3.1	X3.2	X3.3	X3.4	X3.5	X3.6

#### Installing the ON/OFF assembly

Insert the ON/OFF assembly into the monitor trolley and fasten it with the 4 Allen screws. In doing so, ensure that there is no mechanical strain on the cables and that they are not pinched.

# Checking the ground wire connections of the ON/OFF assembly

Check the ground wire connections prior to startup.

To do this, plug the monitor trolley cable coming from the monitor trolley into the C-arm chassis (X10).

Measure the ground wire resistance from the ground wire contact of the power plug to the following measuring points:

from	to	Limit value:		
Ground wire contact on the power plug of the power cable	Monitor trolley, ON/OFF assembly ground wire contact power cable (1/Fig. 2)			
	Monitor trolley, ON/OFF assembly ground wire contact (5/Fig. 2)			
	Monitor trolley, side cover, ground wire connection			
	Monitor trolley, PC (image processor), ground wire connection	_ ≤ 0.2 ohms		
	Monitor trolley, live monitor, ground wire connection			
	Monitor trolley, reference monitor, ground wire connection			
	Monitor trolley, optional printer (if present), ground wire connection			
	C-arm chassis, contact for equipotential bonding			
	C-arm chassis image intensifier housing			

Tab. 1

## **Connecting the UPS**

Connect the power input plug and power output plug to the UPS.

## **Startup**

### **Programming**

Connect the monitor trolley with the C-arm chassis.

Plug in the power plug.

Switch on the system and wait for the system to boot.

Call up local service at the PC (image processor).

Select "Configuration" and then the Next button to open the configuration window.

Under "Imaging System", select "POWER Off Parameters".

Program the "Power Off Grace Period" parameter to 15 seconds. For this, enter the value "1500" (1500 x 10 ms corresponds to 15 s).

Select "Save".

Select "OK" to close the "Power Off Parameters were sucessfully saved" window.

Select "Finish".

Select "Home".

Close the local service.

#### Checks

- Switch off the system.
- Switch it on again after approx. 5 to 10 seconds.
  - If you press the Off button on the monitor trolley, the C-arm chassis is switched off.
  - The PC (image processor) remains switched on.
  - If you press the On button on the monitor trolley, the C-arm chassis is switched on again.
  - The PC (image processor) remains switched on.
  - After the C-arm chassis has booted, the entire system is ready for operation again.
- Switch the system off with the Off button on the monitor trolley.
- Wait for the PC (image processor) to shut down (after approx. 15 seconds).
- While the PC (image processor) is being shut down, switch the system on again with the On button.
  - The imaging system continues to shut down.
  - After that and without the On button being pressed again, the system restarts and is ready for operation after booting.

## **Concluding work**

#### Closing all covers

Close all covers again. Make sure that the protective ground wire connections make good contact.

#### **Ground wire test**

Perform the ground wire test according to ARTD-002.731.17....

Also observe the information on the ground wire test in chapter 1 of these instructions.

Document the measuring procedure.

The measured values must be documented and evaluated in the ground wire resistance protocol.

NOTE

Evaluate the results by comparing the first measured value to the corresponding values documented during preceding maintenance procedures or safety checks.

A sudden or unexpected increase of the measured values, even if the limit value of 0.2 ohms is not exceeded, indicates errors in the ground wire connections.

(Ground wire or contacts)

The ground wire resistance must not exceed 0.2 ohms.

#### System leakage current measurement.

#### **∆WARNING**

#### **Electrical voltage!**

Non-compliance can lead to severe injuries and even death. The system leakage current measurement may be performed on systems of protection class I only after the ground wire test has been passed.

## **∆WARNING**

#### **Electrical voltage!**

Non-compliance can lead to severe injuries and even death.

No housing parts of the system may be touched during the direct measurement of the system leakage current (measuring arrangement according to chapter 1/Fig. 3).

Access to the system by third parties must be prevented.

Perform the system leakage current measurement according to ARTD-002.731.17....

Observe the system leakage current measurement information in chapter 1 of these instructions.

Document the measuring procedure.

The highest measured values must be documented and evaluated in the system leakage current protocol. This value must not exceed the permissible leakage current values according to DIN VDE 0751-1:2001-10, Table F.1, line "System leakage current for devices according to remarks 1 and 3", of 2.5 mA.

#### **NOTE**

Evaluate the results by comparing the first measured value to the corresponding values documented during preceding maintenance procedures or safety checks.

A sudden or unexpected increase of the measured values may indicate that a fault has occurred in the primary circuit of the power supply (damaged insulation, damage caused by humidity, defective interference suppressor, etc.) - even if the limit value of 2.5 mA is not exceeded.

#### NOTE

Where DIN VDE 0751-1:2001-10 applies, the permissible system leakage current limit value is 2.5 mA.

In addition, the national regulations must be observed.

# ON/OFF assembly circuit diagram extract

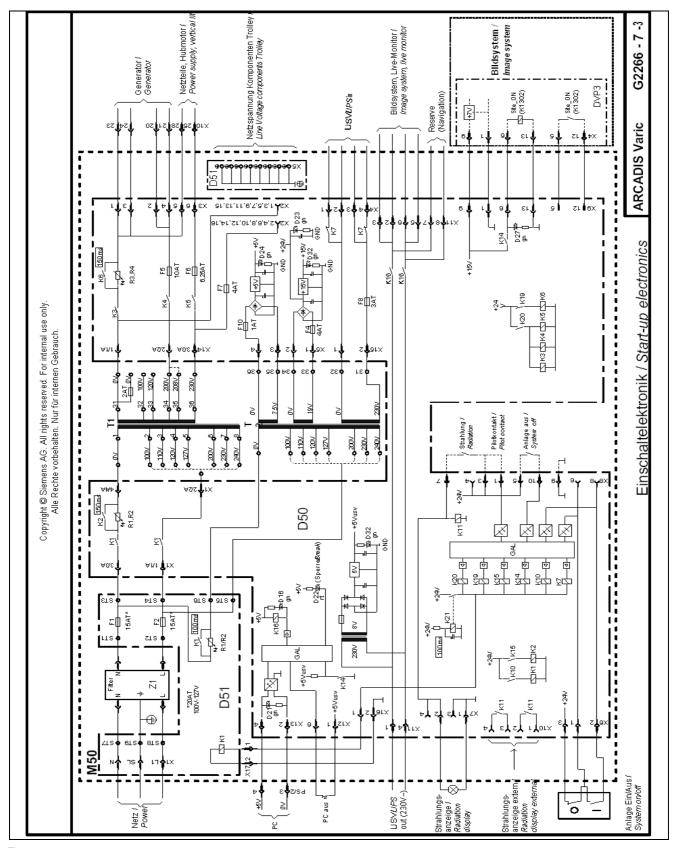


Fig. 4

# **Changes to previous version**

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New publication

# **Changes to previous version**

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